Round 1

Reviewer (D)

Completed: 2024-06-03 07:37 AM

Recommendation: Revisions Required

For author and editor

Main comments:

The region of Kamanjab in Namibia has experienced an increase in moderate-sized seismicity during the last few years which has impacted the local population. In an effort to understand the origin and characteristics of these earthquakes, Angombe et al. re-examine seismic data from a 4-month temporary deployment of 10 seismic stations. They first apply EQTransformer and hypoDD to obtain a detailed earthquake catalogue, followed by statistical and focal mechanism analysis as well as InSAR analysis focusing on two time periods. The authors conclude that the earthquakes behave as swarms rather than mainshock-aftershock sequences and are likely related to tidal modulations and fluid movements in the area.

The work presented is a thorough study with a clear, detailed approach. It contributes important insight into the recent seismicity increase near Anker and Kamanjab, providing much-needed insight on earthquake sources for future PSHA studies for Namibia. I enjoyed reading the manuscript and believe it only needs minor revisions before being accepted for publication in Seismica. I have a few main comments, and more specific comments can be found below.

- Currently there are no hypocentre uncertainties included in the study. Considering a non-local velocity model is used, the reliability of these locations should be discussed.
- A comparison between the 1500 events in Sitali et al. (2022), the 10,000+ detected events, and the 4500 events with refined double-difference locations is of interest. E.g. which are the newly detected events that EQTransformer found that Sitali et al. did not? What are their magnitudes? Same for the hypoDD results.
- The authors state there is an obvious lack of recorded seismic data prior to 2006, however I did not find this obvious from the figure indicated (figure 2b). Especially the claim that it is not instrumental coverage related. Expansion of the text showing support for this (e.g. how does the Mc change over time, the b-value?) and a timeline figure showing the seismicity trend would help.
- I felt that the section arguing for the tidal modulations as the triggering mechanism was short and could be expanded (especially the FFT analysis which came out of the blue), especially since this conclusion is the novel finding of this

study. As a reader I'm left with several questions, e.g.: was it only the two clusters found during hypoDD that showed this trend with tidal modulations, or are there other temporal trends in the rest of the enhanced 10,000+ catalogue? How do the locations of these "triggered" events change between seismic activity peaks? Are the event locations during earth tide troughs any different from tide peaks? Why would this tide-effect be different pre-2006 compared to now?

- The background sections on geology and seismicity of the surrounding region (sections 2.1-2.2) are quite long in proportion to the information required to follow along in the study. Perhaps shorten this down and expand on instead the tidal modulation and fluid migration section.

Specific comments:

Line 120: Please reference this Mw 5.4 normal-faulting event. Also, "*a* Mw 5.4 normal-faulting event"

Line 128: The use of the word "traumatized" is quite subjective. Since this is a scientific article, which should contain more impersonal and objective writing, a more neutral word could be "affected".

Line 132: While I understand the author's aim to highlight the Kamandjab region's seismic vulnerability and lack of earthquake-resilient infrastructure, *"… caused disproportionate societal impact compared to their magnitudes*." is a very strong statement and requires more support from local scientific studies since it makes it sound like M5 earthquakes are not damaging elsewhere in the world with low seismic preparedness. Perhaps re-phrase or tone it down?

Lines 136-137: "*Although most of Namibia is considered to be on a stable passive margin and has no known history of large earthquakes (Kadiri et al., 2023), …*". Could the authors please clarify what "large earthquakes" refers to here? M>7?

Line 141: "we aim to" is in present tense whereas the next paragraph is in past tense.

Lines 155-159: References needed.

Line 155: "*100s km^2 region*" – I got confused by the "s" here. Does it refer to plural as in hundreds of km^2?

Line 174-175: "*There is no clear evidence of paleoearthquakes recorded on either the very old (Proterozoic) or Pan-African (Neoproterozoic-Cambrian) faults*." Reference needed, and also the use of "recorded" is a bit confusing, perhaps "occurring" instead? Or are the authors only considering instrumental record and not historical?

Sections 2.1 and 2.2: the background of the tectonic history and general Namibia seismicity is important, however these sections are very long and can be shortened

without changing the conclusions and discussion of the study. This could be summarized in 1-2 sentences at the beginning of Section 2.3 instead.

Figure 2: The region shown is quite large compared to the study area. To give a better overview for the reader, it would be useful to have a zoom-in just showing the nearby earthquakes to the focus area (e.g. within 100 km). Right now the box is very small and the reader can only see that there are many earthquakes. Figure 1 is already an overview figure for the region. Also, caption: "b) Distribution of historical earthquakes M1…" What is M1? Magnitudes > 1? If so, what is the Mc for the catalogue and how does it vary in time? In the discussion the authors use this figure as support for lower seismicity rate prior to 2006 – could 2006 be highlighted in the figure to better illustrate this?

Line 229-230: "*puzzling challenge*" and "*exceptional opportunity*" are again subjective phrases not very suited for scientific writing. Perhaps just stick to: "… presents an opportunity for investigating natural…"

Line 254-256: "*To evaluate the effectiveness of the workflow, continuous seismic waveform data acquired from the GSN-CGS deployment (July-September 2018) were utilized (Fig. 3)."* This sentence is a bit confusing – currently it implies the continuous waveform data is evaluating the effectiveness of the workflow. Rephrase?

Section 3.1.1: For reproducibility and transparency, could the authors please provide more information on the EQTransformer application (similar to what they've done for the other techniques described in section 3). Were any parameter tests performed to minimize false detections? What type of instruments are used (sampling rate, broadband sensors?, how many instruments were there, how are they distributed, etc.) and how do these compare to the instruments EQTransformer was trained on? Was the default filter used (1.0-45 Hz)? Overlap? There are a few studies showing that the results vary with these parameters (e.g., Yoon et al., 2023, SRL: https://doi.org/10.1785/0120220229; Scotto di Uccio et al., 2022, GJI: https://doi.org/10.1093/gji/ggac487). Please also expand on how the Siamese-EQTransformer step works – any input parameters used there?

Line 270-271 and Line 300-301: Could more information please be provided on the velocity model used? Currently the authors are providing useful information on the Sitali 2022 model that they did not choose to use, but could similar information also be provided on the Midzi 2018 model? – I also checked this reference and could not find a velocity model, do the authors mean the Midzi 2010 model? Did the authors attempt to use any other velocity models? If it is the South African Midzi 2010 model that is being used, how confident are the authors that the geological setting (e.g. sedimentary depth) is similar? There can be a large difference in depths depending on presence/lack of sedimentary layers in the models. It is fine to use this model and the two relative cluster depths will likely not change with other models (though their absolute depth might), but

please provide more thorough discussion on the hypocentre uncertainties that can be linked to the choice in velocity model.

Lines 308-330: Could this also be shown as a figure in the Supplemental Materials?

Line 377: "*a greater seismic hazard potential*" – seismic hazard is related to the intensity of the earthquake ground motion shaking, not the number of earthquakes recorded. Looking at Figure 3, many of these events are quite small/hardly felt, thus not necessarily increasing the seismic hazard. Or has the a- and b-values changed with the newly detected events? If not, these smaller events are expected to be there in seismic hazard studies, just not recorded due to poor station coverage. Seismic hazard assessments generally only consider M>4 events (or M>3 if there really is a lack of events). Perhaps a more accurate way to phrase it would be "more seismically active".

Line 379: "Figure 3b illustrates that the extensive station network was capable…" – do the authors mean Figure 3d as this is the frequency-magnitude plot?

Figure 3, a few comments:

- It is unclear if the events shown are the NLLoc location or hypoDD locations. Based on Figure 6, it looks like the unclustered and unrelocated version (i.e. the NLLoc events). Would it be possible to show the NLLoc locations for events not relocated and hypoDD locations for events that were successfully relocated? Especially since the relocated events are what's used in the rest of the study. Same thing goes for the subplots b-d), it would be great to see which events were refined using hypoDD (e.g. using two colours on the bars and the scatter plot).
- It would be great to see a supplemental figure showing the initial locations from NLLoc and then the refined locations from hypoDD.
- For subplot c) would it be possible to also include the Sitali et al. (2022) events? Perhaps show these with a thicker marker line. It would be interesting to see which were detected in the previous study – i.e. is it only smaller events that EQTransformer found or did it also find previously undetected M>2 events?
- for subplot d) and also Lines 388-390: the magnitude-frequency distribution is generally shown as a cumulative log(counts), this looks like it's just the count per magnitude bin? b-value and Mc should be estimated from the cumulative log10(counts), which is not obvious if this was done here? Also, there is a "*?*" in the caption.

Lines 391-392 and Supplemental Figure S4: Have the events lower than Mc been removed from this figure? Would it be possible to also plot the total seismic moment release per unit area (assuming ML = Mw)? Since there are so many smaller events that have been added to the catalogue, plotting the seismic release for each area bin would

be less biased towards these small events, uneven station coverage, and variable Mc over the study area.

Lines 406-407: *"(refer to Supplementary Figure 4)."* Do the authors mean Figure S5?

Lines 413-419: What are the depth uncertainties for these events? As mentioned in a previous comment, the velocity model can very much affect the depth of earthquakes. Considering this is not a velocity model developed locally – how much do the authors trust the depths obtained? The presence or lack of a sedimentary layer in the 1D velocity model can greatly affect the shallow depths.

Figure 5, Lines 431-433: This is a great figure. I was wondering if doing linear correlation with the envelope of the tides and the daily number of earthquakes time series would better show the correlation between the tide and seismic activity? Also provide stronger statistical proof of the trend. Also, 10,000+ events were detected by EQTransformer, what do their temporal trends look like? Is it only these two clusters that follow this pattern?

Lines 438-444: I would suggest paragraph "The NE-SW striking lineament co-located with…" is better placed directly after the paragraph in Lines 405-412 ("Following the relocation of approximately 4,500…"). This is where as a reader I was wondering about this fault plane.

Line 447, supplemental material table S1: Is the last column supposed to be Mw? The text keeps referring to ML. If they are separate, would it be possible to add a column to Table S1 with the ML values for the reader to compare these two?

Line 450, Figure 3d): If there were only 17 FMSs which were solvable, why are N=64 FMSs shown in Figure 3d?

Line 456: Supplemental figure S9 is mentioned before S6-S8, they should be in the order that they are mentioned in the main text. I also do not fully follow why the cumulative moment magnitude is used and why it would be better than the number of solutions? If more weight should be given to larger events, seismic moment is perhaps a better comparison (since two M2 is not equivalent to a M4). Could the authors please expand on this further in the text. This supplemental text could also be in the main text (in paragraph 454-457) as it is an interesting part of the analysis.

Line 461-462: *"(see example in the Supplemental Material)"* – please specify which figure. Figure S6?

Lines 488-490: Perhaps state the USGS stats here as well to better prove this point (i.e., the 7 km error mentioned in section 5.2). Also, looking at the USGS stats, the closest station was +200km away, so a 10 km error is not surprising at all.

Line 497: *"(Fig. 3d)"* – do the authors mean 3b?

Line 500: *"… 150 events per day, with no significant variations in magnitude or frequency over two months…"* is this excluding events below the Mc? Otherwise the number of events per day can't really be compared. As can be seen from Figure 3c, Mc varies throughout the time period and so the number of small events will not be equal when comparing daily.

Lines 505-512: As a reader, I'd like to see more proof of this increase in seismicity post 2006 for the Kamanjab region. Figure 2 does not clearly illustrate this (as mentioned in a previous comment). For example a supplemental figure with a wider timeline plot similar to Fig 2b or 3c where it's easy to see the 2006 increase, also showing Mc and how it changes with time. Additionally, it would be nice to see a figure with how many operational stations there are within 400 km of the site over this time period to also help illustrate that the instrumental coverage is not the reason for an increased seismicity rate. And finally, down to what magnitude do the authors realistically expect stations 320km and 400km away to be able to record with good SNR?

Lines 513-515: Could the authors also include where is this Mw 7 fault is. Currently this paragraph is a bit confusing to follow.

Lines 548-549: "*This fault orientation is consistent with the regional maximum horizontal stress direction…"* – Optimally oriented faults for reactivation are generally 30° to SHmax, not parallel. Would the authors expect this fault to be reactivated?

Lines 570-572: "*coupled with fast Fourier transform analysis that reveals a dominant 28-day periodicity"* – could the authors please expand on this part. How was FFT applied, and please explain more thoroughly why the amplitude vs period would imply tidal modulation.

Supplemental Materials, Earthquake Catalogue:

- Please include the units and magnitude type in the column headers (e.g. Lat_deg, Lon_deg, depth_km, ML or Mw, etc.).
- Could horizontal and vertical hypocentre uncertainties also be included in the catalogue?
- It would be of scientific interest to include the full 10,000+ event catalogue output from the EQTransformer and relocated using NLLoc. The hypoDD results can then be provided for events successfully relocated.

Victoria Stevens (E)

Completed: 2024-05-23 03:29 AM
Recommendation: Revisions Required

Reviewer Comments

For author and editor

In this paper the authors reanalyse data from a temporary seismic survey in northern Namibia using novel techniques to identify many more events and accurately locate them. With the additional use of InSAR, they hypothesise a previously unknown active fault with swarm-like earthquake behaviour. I find this paper to be very well written and well organised with clear and useful figures. Novel techniques are applied to a little-studied area with great results and should be of interest to both those who study seismology, tectonics, and those with an interest in seismic hazard in 'low-seismicity' regions.

The importance of the study could be highlighted more in the abstract and conclusions, and some of the results need a little more justification. See my comments below for details.

Abstract

L23. Missing 'event', or 'earthquake'.

Can you make it clear that the earthquake catalog from 2018 has already been reported on? The way it's currently written makes it sound like this might be a new result of this paper.

Can you add anything about the wider significance of this study? (See your paragraph at L240-244). Are there any implications for seismic hazard? Is there much more seismicity in Nambia than general thought (and is it only the lack of instrumentation that makes it appear low-seismicity)?

For example, can you make any comment about if this seismicity will get worse, will it go away soon, does it follow the GR law and there's a low chance of a larger earthquake, or because it's to do with water movement will the earthquakes remain small?

L96: 1918 → 2018

Non-technical summary

L112: Instead of ''seismic'', use ''earthquake'' instead, since this is more familiar to most people.

L114-117: Instead of ''fault system'' and ''trend'', and ''active faults'', ''triggering this earthquake swarm'' try and use simpler, non-geological words (I know it's very difficult!). Highlight your conclusions even more and explain why this is important, i.e. why normal people should be interested in this.

1. Introduction

The first paragraph of the introduction (L119-135) is really interesting and gives a great context as to why the temporary network was set up here and the seismic risk. Parts of this section could be mentioned more in the abstract and non-technical summary since it highlights the significance to people of your study.

Add one sentence at the end of the introduction explaining the structure of the rest of the article e.g. We first discuss…., then …..

2. Geological Setting

L201: Missing word and bracket after Fig. 1

L233-L234: Add a phrase such as ‘’in this study’’ to make it clear that you’re still talking about previous work. Then on L240 you can emphasise what new analysis you’re doing.

L240-244: This is a great paragraph, some of which should go in the abstract to highlight why this work is generally important.

Fig 2

You mention the ‘’Damara Belt’’ (L198) when you reference this figure, so it would be nice if you could mark / label where this is.

a) What does the word Rivers mean in the figure just above G-A? Is this a mistake? For the elevation key, remove the section below zero.

b) Add ‘’0’’ to the depth scale. Also, add a vertical (perhaps dotted) line to the histogram at the year 2006 and perhaps give the earthquakes recorded by the temporary network of 2018 a different pattern (see L506 comment).

How much does the distribution of stations influence this picture of seismicity? Because you’ve included the earthquakes from the temporary station in Kamanjab, it’s natural that we see a concentration of earthquakes there. There seem to be generally more earthquakes in the north of Namibia, but this is also where there are more stations, so it’s hard to draw any conclusions. In the east of your figure there are very few earthquakes and no seismic stations - or did you only mark those stations within Namibia? Whether the station distribution influences the pattern of earthquakes might not be important for the point of your paper, but a simple sentence about it would be useful.

3. Method

L360: missing word ‘’earthquake’’ or ‘’event’’

4. Results

L375: Add a reference to Fig 9 when you mentioned Station 9, so we can see where you mean.

L375: Add a year to the dates.

L375: Why did you only look at earthquakes within this date range rather than the entire duration of the catalogue?

L376-378: Did these newly detected earthquakes have a similar magnitude range to the previously detected earthquakes? If the new earthquakes are all smaller, then the hazard potential wouldn't necessarily be higher. Please add some clarifying words here.

L380: Formatting of second '-1' needs correcting.

L385: You mention that line a' in Fig. 3b shows that the aftershock frequency adheres to Omori's formula, but I don't get this impression from the figure. To me, the number and variability of the number of earthquakes after the ''mainshock'' on 30th July looks the same as before the earthquake. I can't see that the blue a' line fits the green bars, so please justify this point further, especially since you use the decay rate p as evidence for swarm-like activity. Additionally, on L495-497 you say there is ''a lack of a distinct mainshock-aftershock pattern'' and the aftershock pattern ''does not follow the expected behavior described by Omori's decay law''. I'm confused as to why you're using the p-value from the fit, then later saying it doesn't fit at all, or am I missing something?

L388-389: Please add uncertainties to your b-value. It would be useful to see a figure similar to 3d) but showing cumulative count (log10) on the y-axis and magnitude on the x-axis, plotting the data as points i.e. a normal GR diagram (it could be a Supplementary Figure). This would help the reader better judge the fit of the GR line. Again, this is an important point as you use the fact that the b-value is more than 1 as further evidence of swarm-like activity. It could be useful to add a line with b = 1 to your diagram to show that this value of b doesn't fit the data well, helping to justify your point that the b-value is above 1 (though if this just adds confusion to the figure feel free to leave it out).

L394: Was there any reason you picked this date?

L438: Did you mean Fig 3a) or Fig 4a), or both?

L470: Add ''However'' at the beginning of the sentence starting ''The time series'' to make it clear that this time series shows something, in contrast to the coseismic interferogram.

L471: M54. dot in the wrong place

Fig 3

Caption:

The dates you mention here are 10 July to 24 Sept 2018, but on L375 you mention 21st Sept.

Missing dot in ML 34

Missing reference, currently a question mark.

See my previous comment on L385 regarding Omori's Law.

a) Perhaps flip the depth scale so 0 km is towards the top of the page

Fig 4

Caption: b) should be b) and c), then c) should be d).

Fig 6

In the last sentence of the caption, add that the inferred fault strike is based on the results here. At the moment it's not clear if this is the case, or if it had already been inferred e.g. by the USGS.

5. Discussion

L505: offset → onset

L506: Add a vertical (perhaps dotted) line to Fig. 2b histogram at the year 2006, as currently, it's slightly hard to tell when this year is. It's slightly unfair that this histogram includes the temporary network of 2018, when lots of earthquakes were detected which wouldn't have been otherwise. A solution might be to give this part of the column in the histogram a different pattern.

6. Conclusion

Add a sentence or two regarding the points you make in paragraph L240-244, i.e. seismic hazard and expanding seismological observation capacity.

Data and code availability

Check this section for grammatical errors.

Supplementary Information

You don’t currently reference Movie S2 in the main text, but when I saw Figure 4, something like this movie was exactly what I wanted to see so please mention it here. A similar Movie with earthquakes appearing over time (and perhaps colour-coded by date) would also be a great addition.

Victoria Stevens

Reviewer (F)

Completed: 2024-05-28 05:49 AM

Recommendation: Revisions Required

Reviewer Comments

For author and editor

I will start by thanking you for giving me the opportunity to review this paper as I think it is a good paper that is proving import information and data that will help in the understanding of seismology in Namibia.

Please note that most of my comments and corrections are in the attached manuscript file. I used notes and other editing tools in pdf to give my input.

I just have a couple of more suggestions / questions:

1. Figures should be placed closer to places where they were first cited.

2. Though in general I am happy with thway your results and data suport your conclusions, I have one question on the dip direction of the suggested causative fault. The clusters of events, especially as shown in Figure S5, suggest a fault dipping westwards whist your InSar data suggests a NE dippining fault. How do you explain this apparant discrepancy?

3. I am not sure if I can comment on Supplementary infromation, but I have just a couple of observations:

- Be consistent in labelling of figure captions. Use Figure S** consistently.

- Sort you your data in the supplementary file "Complete_relocated_Earthquake_Catalog.csv" into individual separate columns.

(from marked pdf):

Line 119: I think this is supposed to be Kamanjab

Line 140: potentially

Line 174: What kind of evidence? Any reference confirming this?

Line 177: Any references of geological mapping?

Line 197: Is there any seismicity that can be associated with these faults?

Line 201: Remove extra space

Line 221: ....Mw5.4 earthquake on...

Line 224: single station location. I think that is the challenge rather than detection.

Line 225: replace this text with "are"

Line 226: of the study area.

Line 232: 0 and 20

Line 233: 10 and 25

Line 239: association of seismicity with faults.

Line 254: These are two different techniques. Anyway I think the authors referred only to the maximum likelihood.

Line 264: ...type, a post-processing....

Line 265: Replace with: with

Line 274: replace with: in the Sitali et al. (2022)

Line 275: Replace with: ... ratio of...

Line 298: provides

Line 309: Can we have a figure showing this elbow? Also one of th obtained clusters.

Line 313: epicentral or hypocentral distance?

Line 314: Modify this sentence as follows: This equation was empirically derived by Saunders et al. (2023) using analysed synthetic .....etc

Line 317: I think they used data from many permanent stations in South Africa and obtained station corrections at 26 of those permanent stations..

Line 343: Figure S2 and S3

Line 375: Modify as follows: Using data recorded by ten temporary.....

Line 376: of

Fig. 3 Caption: 3.4

Line 380: This looks like a subscript.

Line 389: However, the value of 1.14 is very close to 1.0 for natural events. This is not clear evidence of a swarm. Maybe recalculate your b-value fitting the data properly. Use maximum likelihood technique under program b-value in SEISAN or other programs that use similar techniques (eg. Z-Map)

Line 392: Figure S4

Round 2

Reviewer A

Completed: 2025-03-08 04:17 AM

Recommendation: Revisions Required

Reviewer Comments

For author and editor

I thank the authors for their careful consideration and thorough response to the previous version's review comments. With the improvements made, I just have a few very minor comments and believe that the manuscript is nearly ready for publication.

1) Regarding your Mc and b-value results and discussion, the estimated completeness magnitude shown in Figure 3 looks a bit low, which could bias your estimated b-values. Which method was used to estimate Mc? (Please include in the text). Usually Mc is somewhere before the fall-off curve, which in Figure 3 makes it look like just below M0. Mc should also be placed so that the b-value is not affected by improving the completeness of the catalogue (i.e. adding more low-magnitude events: Lines 587-588). One simple method is e.g. the maximum-curvature approach (Woessner & Wiemer, 2005, BSSA, https://doi.org/10.1785/0120040007; Wiemer & Wyss, 2000, BSSA, https://doi.org/10.1785/0119990114). Another approach to calculate the b-value when the catalogue is incomplete is be the b-positive approach, which does not require estimating the Mc (van der Elst, 2021, JGR, https://doi.org/10.1029/2020JB021027)

2) Figure 5e) typo in the subplot title: "steping" = "stepping"?

3) The reader is still left wondering what this "Fast Fourier Transform (FFT) analysis" involves (Lines 652-653, clean version). E.g., what is the goal of the analysis (what is it the authors are estimating)? Is the FFT of the full windows (P+S+surface waves) taken? Is it a noise analysis and estimating PSD? Or is it the maximum PSD every day? What part of the spectra is extracted to create Figures S17 and S18? What frequency does the points in the figures correspond to? Is any preprocessing done to the signals (e.g. removed attenuation? filtering?). Please expand in the text (e.g., Line 340 where first

mentioned). Also, Figures S17 and S18 are identical, was the wrong figure inserted for S18?

Reviewer B (Victoria Stevens)

Completed: 2025-04-08 01:49 AM

Recommendation: Accept Submission

Reviewer Comments

For author and editor

This is my second time reviewing this manuscript and I find it greatly improved. It is high quality science and the delineation of a new, previously unknown fault through both seismicity and InSAR is exciting and important for the advancement of seismic hazard in Namibia. A few minor comments are below.

Figure 3b) and paragraph 417-427: Is there some way that you can show the Omori decay fits with a higher degree of probability than simple a constant rate of earthquakes? Is it possible to give a probability value to your four different examples of Omori fits with different k-value assumptions?

L422-424: Similar to the point above, is it more likely that k=1000/2000 rather than the higher k values which would give higher p values? If not, I might rephrase these sentences to say that the Omori fit is not inconsistent with swarm behaviour rather than implying it is evidence of swarm behaviour.

L499-517: This is a lot of explanation that's quite dry to read for something which readers can easily just see in Figure 5, so I'd make these paragraphs shorter. Additionally, I'd like to see uncertainties on the b-values; since there are not so many events in each time window to calculate this value, I wonder how much can actually be read into these changing values or whether they all fall within the uncertainty.

L568: The 'absence of a distinct mainshock-aftershock pattern' - this seems to come out of nowhere, since above you were describing finding a p-value to fit the Omori law. As previously mentioned, you could find the probability that a constant rate fits the earthquakes, or at least mention more clearly in the previous section that because the p-values are so low, it seems there may not even be a 'mainshock-aftershock' pattern, so that when readers get to the current section this sentence follows from earlier. At the moment it feels a bit like earlier you are trying to show there is an aftershock decay sequence (which I don't think you are, but it reads a bit like this), then here you are saying there is not an aftershock sequence.

L615: enhance --> refine ?

L697: Vitoria --> Victoria

Reviewer C

Completed: 2025-03-14 09:58 AM

Recommendation: Revisions Required

For author and editor

I have included a few comments and correction in the attached file.